JENNIFER M. GRANHOLM
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF LABOR & ECONOMIC GROWTH
LANSING

KEITH W. COOLEY
DIRECTOR

October 21, 2008

To: Elevator Safety Board

From: C. W. Rogler

Subject: Variance request regarding ThyssenKrupp Elevator's new line of Synergy MRL's

Request has been made by ThyssenKrupp Elevator to discuss their new line of MRL Elevators with the Elevator Safety Board.

Division Recommendation

The Elevator Safety Division recommends the Elevator Safety Board form a committee to review the information.

ThyssenKrupp Elevator

Detroit Branch

9-5-08

Cal Rogler
Bureau of Construction Codes & Fire Safety
P.O. Box 30255
Lansing, MI 48909

Re: Variance Request

Dear Cal and Elevator Safety Board:

I would like to request to sit at the next variance board meeting and discuss ThyssenKrupp Elevator's new line of MRL elevator. I am enclosing three copies of the new information regarding this new elevator.

Please let me know the dates and details of additional information that you feel should be included that is not in the included documentation. Thanks in advance for your consideration.

Sincerely,

Cornell Myers
District Manager

cc: file, scanned e-mail,

ThyssenKrupp Elevator Corporation
35432 Industrial Road
Livonia, MI 48150
Telephone: (734) 953-3734
Fax: 734-953-3788
E-mail: cornell.myers@thyssenkrupp.com
Internet: www.thyssenkruppelevator.com

ThyssenKrupp Elevator
Americas Business Unit

Product Development

To: Authorities Having Jurisdiction
From: Phillip Hampton, Chief Engineer / Manager, Codes and Standards
ThyssenKrupp Elevator
Date: Aug 19, 2008
Re: A17.1 Code Deviation list for synergy® L

This letter is a request for consideration to install our new product in the synergy® series of elevators. The following description details the deviations from your adopted Code. We look forward to your favorable consideration.

System Description

ThyssenKrupp's newest MRL elevator is a culmination of years of progressive planning and testing aimed at minimizing operating costs while maximizing space. It also marks the next step of a global initiative spearheaded by ThyssenKrupp Elevator AG to assimilate over 30 global MRL products. Its advanced gearless machine features energy efficient drives with options to provide regenerative drives that transfer unused power back to the building, saving energy and money. synergy® also does not use any oils, solvents, or other substances that are harmful to the environment, which supports the U.S. Green Building Council's LEED Rating System.

L series

The synergy L Series is a low-rise elevator solution perfect for applications up to 100 feet of travel @ 200 FPM & 140 feet of travel @ 350 FPM. This cost-effective feature-specific model elevator with the machine mounted on counterweight rails uses 8mm rope and requires minimal overhead.

M series

The synergy M Series is a mid-rise elevator solution perfect for applications with increased speeds & higher rises. This cost-effective feature-specific model elevator uses 8 mm rope. The machine is mounted in the overhead with a compact footprint.

H series

The synergy H Series is a multiple-featured flexible solution. Ideal for buildings that need higher rises, speeds or duties, this elevator utilizes an overhead structure and therefore requires additional overhead. Using 10mm rope, it is code-compliant in all jurisdictions.

Capacity (00) | Speed (0)		
L Series		
21|20		
25|20	25|35	
30|20	30|35	
35|20	35|35	
M Series		
	25|35	
	30|35	
	35|35	
H Series		
21|20	21|35	21|50
25|20	25|35	25|50
30|20	30|35	30|50
35|20	35|35	35|50
40|20	40|35	40|50
45|20	45|35	45|50
50|20	50|35	50|50

ThyssenKrupp Elevator Corporation
9280 Crestwyn Hills Dr
Memphis, TN 38125
Telephone: (901) 261-1579
Internet: phillip.hampton@thyssenkrupp.com
www.thyssenkruppelevator.com

The synergy® L series MRL elevator system is ThyssenKrupp Elevators new low-rise elevator targeting buildings with rises up to 100 feet @ 200 FPM and 140 feet @ 350 FPM. As with all TKE products, this product is backed by the TKE training and service network.

At the core of the L series is the time tested TAC50-04 Controller located either on a wall in the hoistway overhead accessible from the cartop, or depending on the building design, located in a control room adjacent to or remote from the hoistway.

The machine is a Torin GTW3 Machine, a "pancake" design. The machine is located on the overhead counterweight structure.

The speed governor used with the L series is a newer variation of our standard governor. Using the existing TKE 5501 12" governor frame and tail weight, the governor has been modified to perform a self-resetting function when the car is moved in the up direction after tripping. This eliminates the need to enter the hoistway to reset the governor. The options of a remote trip function and a remote switch resetting function are also available.

The Blocking Means for use in MRL applications is provided when necessary as a work or inspection platform safety device. When engaged, this device establishes a hard dock for the car and opens the safety circuit.

synergy® L uses 8 mm steel wire hoist ropes with a 40 to 1 D to d cast iron traction sheave, are available from 2100 lb. capacity passenger cars up to 3500 lb with both front and rear openings. Various door sizes and opening types are available with car speeds up to 350 fpm.

The Motor Controller is located in a machinery space in the hoistway or alternately in a control space outside the hoistway. A means for passenger rescue is provided with a temporary power source which will electrically pick the brake, allowing the imbalanced load to drift the elevator at a limited speed to a landing if necessary.

synergy® L complies with A17.1-2007/B44-07 with the exception of suspension means and deflector sheave material. This document lists the deviations to A17.1-2004. Except for the following deviations, all other A17.1 requirements are complied with. In all cases, the NFPA 70 (National Electric Code) requirements are complied with.

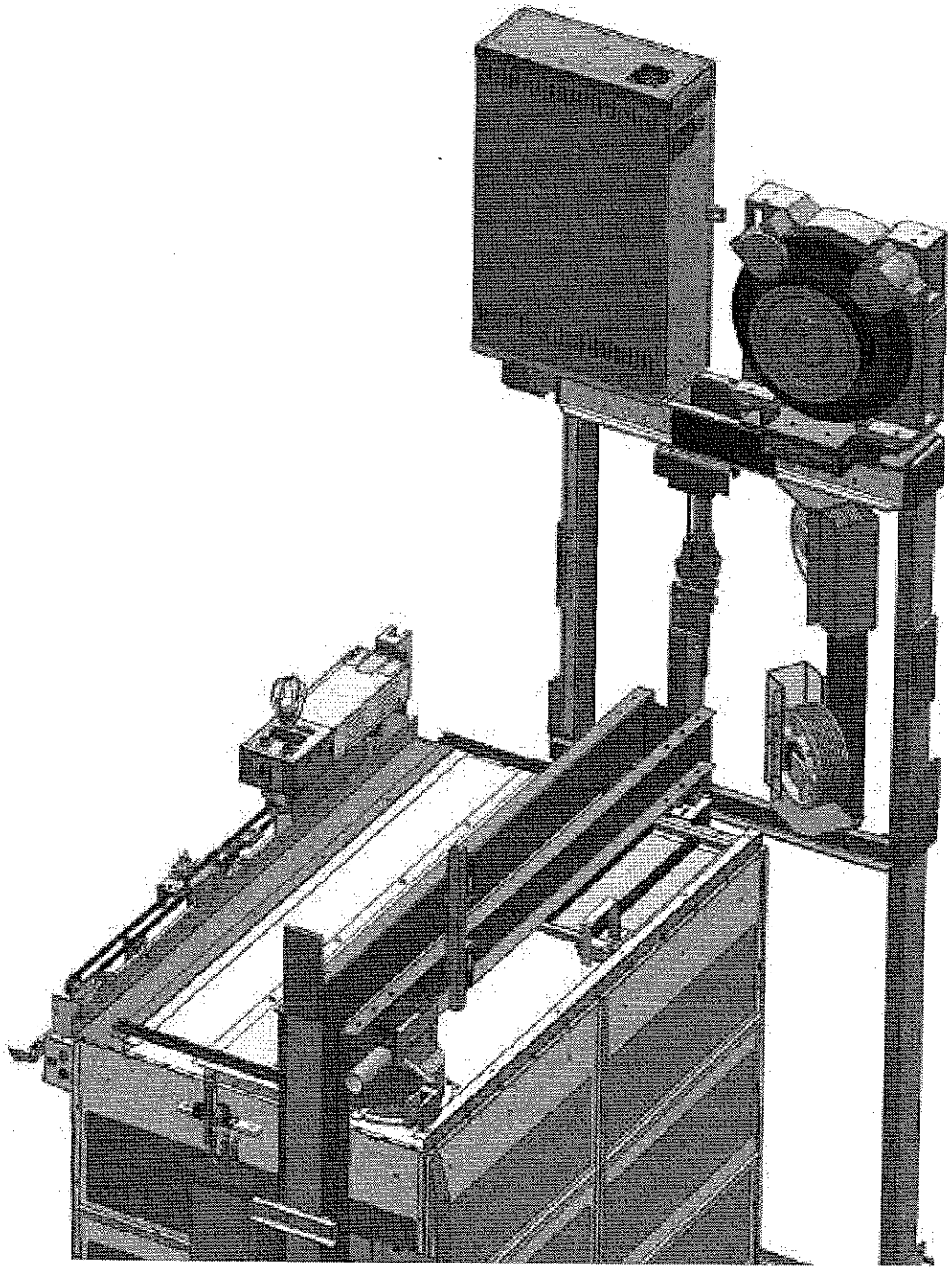


Figure 1 – Top of Hoistway

A17.1-1996 through A17.1-2004 Code Deviation List

This list is current as of August 2008. The complete detailed product submittal is available on request.

Deviation 1
8 mm Steel Wire Ropes and minimum wire size less than 0.56 mm (0.024 in.)

Code
A17.1-1996 through A17.1d-2000, Rule 212.4
A17.1-2000 through A17.1-2007 requirement 2.1.3 and 2.7.3

2.20.4 Minimum Number and Diameter of Suspension Ropes The minimum number of hoisting ropes used shall be three for traction elevators and two for drum-type elevators.
Where a car counterweight is used, the number of counterweight ropes used shall be not less than two.
The term "diameter," where used in reference to ropes, shall refer to the nominal diameter as given by the rope manufacturer.
The minimum diameter of hoisting and counterweight ropes shall be 9.5 mm (0.375 in.). Outer wires of the ropes shall be not less than 0.56 mm (0.024 in.) in diameter.

Requested deviation
To allow the use of smaller diameter ropes conforming to all the requirements of the proposed A17.6 and A17.1 language below.

A17.1-200X/B44-0X Proposed Code

2.20.4 Minimum Number and Dimensions of Suspension Ropes Means

2.20.4.1 Suspension Steel Wire Ropes The minimum number of ~~hoisting ropes~~ suspension members used shall be three for traction elevators and two for drum type elevators.
Where a car counterweight is used, the number of counterweight ropes used shall be not less than two.
The term "diameter," where used in reference to ropes, shall refer to the nominal diameter as given by the rope manufacturer.
The minimum diameter of suspension and counterweight ropes shall be ~~8 mm (0.312 in.)~~ 4.0 mm (0.156 in.). Outer wires of steel wire ropes shall be not less than ~~0.51 mm (0.020 in.)~~ 0.21 mm (0.008 in.) in diameter.

Reference
8 mm, 8 x 19 steel wire rope has been used worldwide for more than 40 years and in North America. One rope manufacturer, with an estimated 20% of the Global market, has sold over 20 million meters of 8 mm rope with no indication of problems. One elevator manufacturer has over 75,000 elevators with 8 mm rope. Changes in the North American marketplace have created practical application for these rope sizes.
The Code language is being developed in the Standard for Elevator Suspension, Compensation and Governor Systems; Part 1 of A17.6 and proposed A17.1 language.

Please see attached rope manufacturers data, specifications, and certification.

Deviation 2
Sheaves required to be metal

Code
A17.1-1996 through A17.1d-2000, Rule 208.2
A17.1-2000 through A17.1-2007 requirement 2.24.2

Sheaves and Drums
Material and Grooving. Sheaves and drums used with suspension and compensating ropes shall be of metal and provided with finished grooves for ropes or shall be permitted to be lined with nonmetallic groove material.

Requested deviation
To allow the use of non-metallic sheaves based on the language of the proposed A17.1 language below.

A17.1-200X/B44-0X Proposed Code

2.24.2 Sheaves and Drums
2.24.2.1 Material and Grooving. Sheaves and drums used with suspension and compensating members shall be constructed of materials conforming to 2.24.2.1.1 or 2.24.2.1.2 and provided with finished grooves or shall be permitted to be lined with nonmetallic groove material. Sheaves and drums shall comply with 2.24.3

2.24.2.1.1 Sheaves. Driving machine sheaves shall be integral with or directly attached to driving machine shafts. Sheaves shall be provided with steel shafts and metal bearings. Sheaves constructed of plastic, fiber reinforced plastic or combinations thereof shall be non-regroovable. Permanent and legible marking shall be provided on or adjacent to the non-metallic sheaves stating "Regrooving of sheave is not permitted"

Reference
Please see attached sheave manufacturers data and finite element analysis which demonstrates compliance to the minimum factor of safety required for sheaves.

Several systems in operation worldwide including North America use non-metallic idler, deflector, and compounding sheaves. Unlike lined sheaves allowed by the Code, the entire sheave assembly is made of plastic with the bearing housed in the hub of the material. These non-metallic sheaves have been in common use in North America for many years. Because they will comply with all the factors of safety as
high elongation material sheaves must comply with, our experience with their use in previously approved products and their proposed inclusion into A17.1, we are asking for their continued use.

Deviation 3
(Note: Not required in jurisdictions with adopted code of A17.1 – 2005s or later)

Governor access door required

Code
A17.1-1996 through A17.1d-2000, Rules 100.3 and 101.3
A17.1-2000 through A17.1-2004 requirement 2.1.3 and 2.7.3

Floor Over Hoistways
General Requirements
(1) A metal or concrete floor shall be provided at the top of the hoistway.
(2) Floors are not required below:
...
(b) overhead sheaves, governors, and other equipment where the elevator machine is located below or at the side of the hoistway, provided that:
(1) means of access for inspection and servicing of governors conforming to the requirements of Rule 101.3c is provided from outside the hoistway;
(2) sheaves and other equipment (except governors) may be inspected and serviced from the top of the car, or means of access from outside the hoistway conforming to the requirements of Rule 101.3c may be provided.

Requirements for Means of Access.
The means of access to machine rooms, machinery spaces, and different floor levels in machine rooms, shall conform to the following.
...
(2) A permanent noncombustible stair shall be provided where the floor of the machine room or the machinery space above or below the floor or roof from which the means of access leads, or where the distance between the machine room floor levels, is 3 ft (914 mm) or more. Vertical ladders with handgrips may be used in lieu of stairs for access from building floors or machine rooms to machinery spaces containing overhead sheaves, secondary and deflecting sheaves, governors and auxiliary equipment not including controllers and motor generators.
...

Requested deviation
To not require the Governor Access Opening based upon A17.1 – 2007 / B44-07 language below.

A17.1-2007/B44-07 Code

2.7.6.3.4 Where a governor is located inside the hoistway, means of access conforming to the requirements of 2.7.3.3 and 2.7.3.4 for inspection and servicing the governor shall be provided from outside the hoistway. The access opening shall not be required where:
(a) the governor can be inspected and serviced from the top of the car or adjacent car, and the governor can be tripped for testing from the adjacent car or outside the hoistway; and means are furnished to prevent movement of the car when servicing the governor. A sign with the words "SECURE CAR AGAINST MOVEMENT BEFORE SERVICING THE GOVERNOR" shall be prominently posted and be visible from the governor. The sign shall conform to ANSI Z535.2 or CAN/CSA-Z321, whichever is applicable. The sign shall be of such material and construction that the letters and figures stamped, etched, cast or otherwise applied to the face shall remain permanently and readily legible; and
(b) for elevators in a single hoistway, the governor can be reset automatically when the car is moved in the up direction or the governor can be reset from outside the hoistway.

Reference
The synergy® L system is a machineroomless design, meaning the machine is located in a machinery space in the hoistway. The requested deviation is to not require a governor access

door based on the current published Code until the jurisdiction adopts this language. The synergy® L design fully complies with the A17.1-2007/B44-07.
There is not a reference to this item in the submittal, it is a stand alone item based on the published code that allow this configuration.

Deviation 4
(Note: Not required in jurisdictions with adopted code of A17.1 – 2005s or later)

Machine in hoistway

Code
A17.1-1996 through A17.1d-2000, Rule 101.6
A17.1-2000 through A17.1-2004 requirement 2.7.6

Location of Machine Rooms and Control Rooms
Elevator machine and control rooms shall not be located in the hoistway. Drive and deflector sheaves and machine parts and supports are permitted to project into the hoistway (see 2.1.3.1).

Requested deviation
To allow the location of the machine conforming to all the requirements of the A17.1-2007/B44-07 language below.

A17.1-2007/B44-07 Code

2.7.6 Location of Spaces and Rooms, and Equipment

2.7.6.1 Location of Machine Rooms and Control Rooms
Where provided, elevator machine rooms and control rooms shall not be located in the hoistway.

2.7.6.2 Location of Machinery Spaces and Control Spaces
Spaces shall be permitted to be located inside or outside the hoistway.

2.7.6.3 Location of Elevator Equipment
The location of equipment used directly in connection with the elevator shall conform to the requirements of 2.7.6.3.1 through.2.7.6.3.4.

2.7.6.3.1 The driving machine shall be located in a machinery space or machine room.

Reference
The synergy® L system is a machineroomless design, meaning the machine is located in the hoistway. The language above is from the A17.1-2007/B44-07. The requested deviation is to allow the location of the machine based on the later published Code until the jurisdiction adopts this language.
Strictly speaking, "machine rooms" are not allowed in the hoistway according to the pre A17.1-2005S Code, however it has been ruled in some jurisdictions that designs where the machine is in the hoistway is in violation of this requirement. The A17.1-2007/B44-07 changed to clarify this requirement and made numerous changes to assure safety of this

design for elevator personnel. The synergy® L design fully complies with the A17.1-2007/B44-07.
There is not a reference to this item in the submittal, it is a stand alone item based on the published code that allow this configuration.

Deviation 5
(Note: Not required in jurisdictions with adopted code of A17.1 – 2007 / B44-07)

Retractable pit ladder

Code
A17.1-1996 through A17.1d-2000, Rule 106.1(d)(2)
A17.1-2000 through A17.1-2004 requirement 2.2.4.2

There shall be installed in the pit of each elevator, where the pit extends more than 900 mm (35 in.) below the sill of the pit access door, a fixed vertical ladder of noncombustible material, located within reach of the access door. ...

Requested deviation
To allow the use of retractable pit ladders conforming to all the requirements of the A17.1-2007/B44-07 language below.

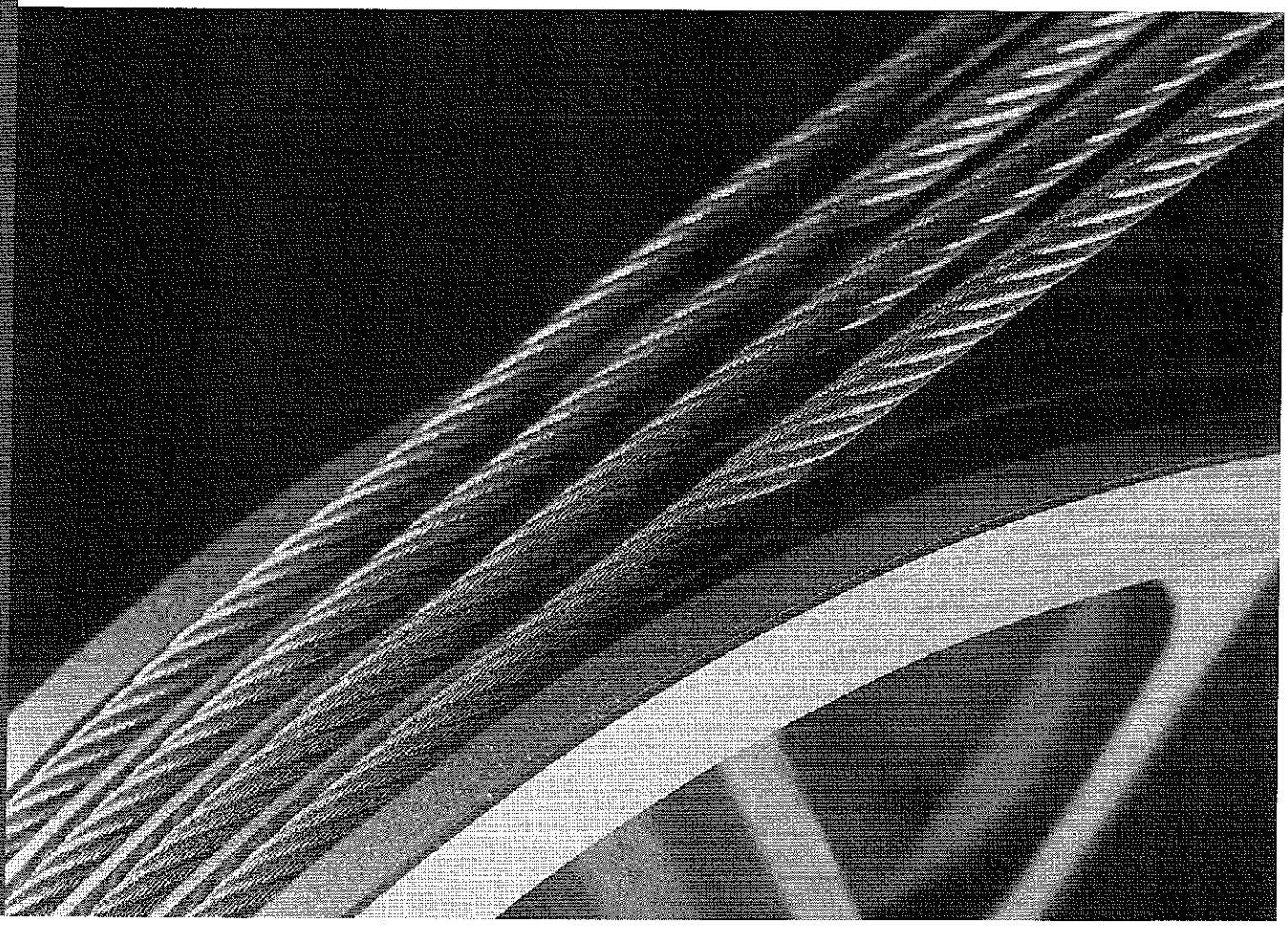
A17.1-2007/B44-07 Code

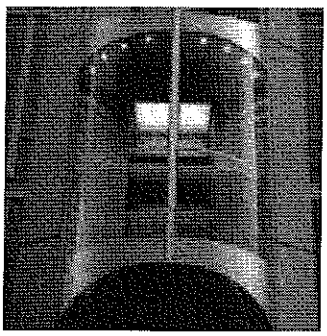
2.2.4.2 There shall be installed in the pit of each elevator, where the pit extends more than 900mm(35 in.) below the sill of the pit access door (lowest hoistway door or separate pit access door), a fixed vertical ladder of noncombustible material, located within reach of the access door. The ladder is permitted to be retractable or nonretractable. Nonretractable ladders, where provided, shall conform to 2.2.4.2.1 through 2.2.4.2.6. Retractable ladders, where provided, shall conform to 2.2.4.2.1 through 2.2.4.2.3 and 2.2.4.2.5 through 2.2.4.2.8. When in the extended position, retractable ladders shall conform to 2.2.4.2.4.

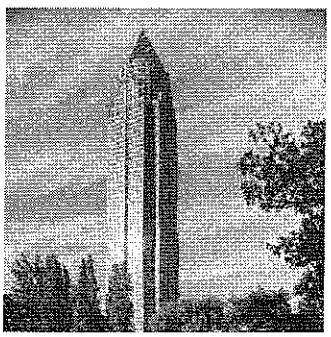
Reference
There is not a reference to this item in the submittal, it is a stand alone item based on the published A17.1-2007 that allow this configuration.

PFEIFER DRAKO

ELEVATOR TECHNOLOGY







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ELEVATOR ROPES/USA

Delivery Program

Elevator Industry
- special ropes of 6-strand and 8-strand construction
- special ropes with 9 and 10 outer strands for high rise/high speed installations
- special compensating ropes
- compensating cables (chains) and their suspension means
- Ropes for small goods elevators, overspeed controllers and door mechanisms
- ropes for gondola systems with inner electric conductors
- round travelling cables
- flat travelling cables
- halogenfree cables
- special cables
- suspension means for cables

Mechanical and Construction Industry
- special crane and excavator ropes with 8 and 9 outer strands
- rotation-resistant and non-rotating ropes for electric hoists
- non-rotating ropes for tower cranes and mobile cranes
- winch ropes, clamshell ropes and pendant ropes
- slings according to DIN 3088 and ISO 8792

Mining
- Koepe hoist ropes
- drum hoist ropes
- flat hoist ropes
- flat balance ropes
- round balance ropes (multi-layer flat strand ropes)
- haulage ropes for monorail conveyors
- signal ropes
- non-rotating ropes with inner electric conductors

Shaft Sinking
- rotation resistant and non-rotating stage ropes
- flat hoist ropes
- clamshell ropes
- guide ropes
- direction survey ropes

Oilfield Industry
- rotary drilling lines according to API Spec. 9A and DIN 5881
- swab and bailing lines
- winch lines
- percussion drilling lines
- air winch lines
- logging lines and wires
- slings

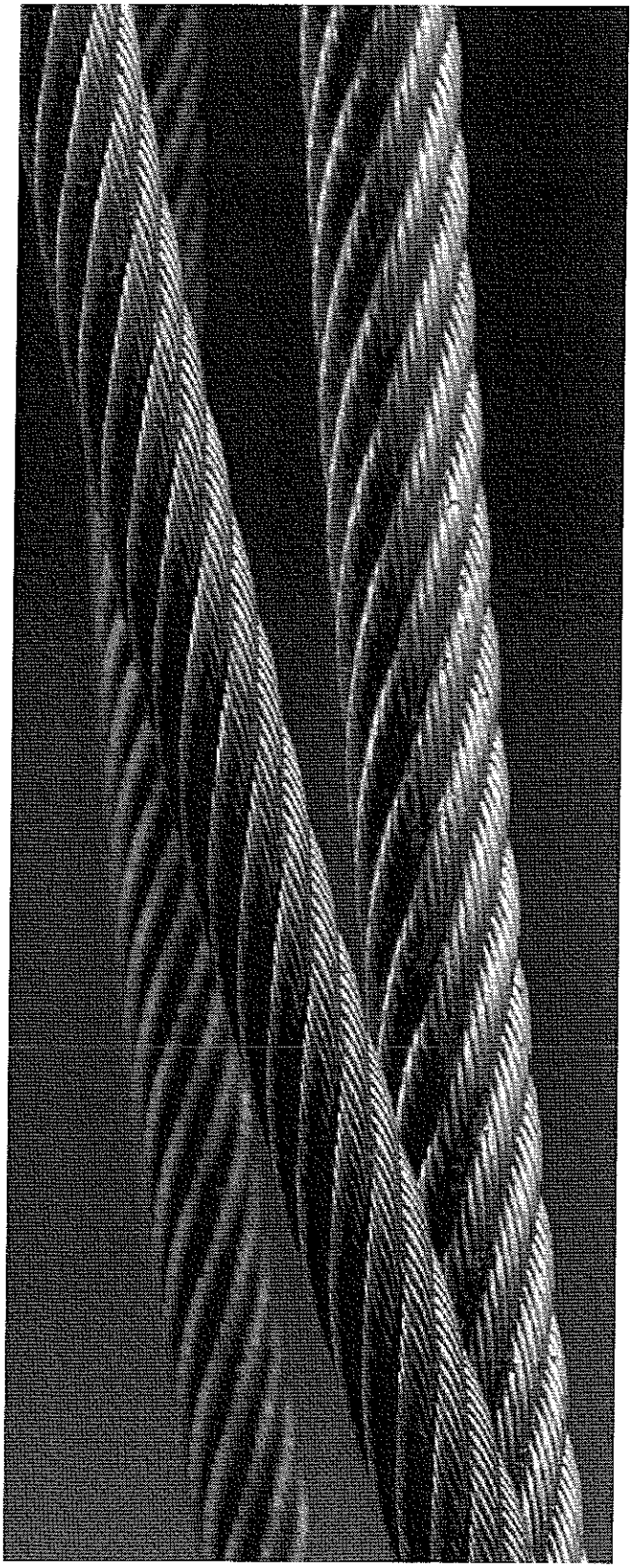
Cable ways
Stranded ropes for
- aerial tramways
- gondolas
- chair lifts
- T-bar lifts
- furniculars
- grooming vehicles

according to German, Austrian, Swiss and European regulations and standards.
- Installation on request

Additional
- rope terminations
- wire rope socks for cables and ropes
- wire rope with polymer cover
- synthetic and natural fibre ropes
- stainless steel ropes
- spiral ropes and strands (automotive industry)
- deep sea research ropes.

Approvals and certifications:
- Approved by Germ. Lloyd, Lloyd's Register of Shipping
- Quality Managementsystem acc. EN ISO 9001

Contents



Rope Grades

The international "metric" rope grades are designated by figures, without the N/mm². USA is using another designation system, based on words. For better understanding, we show here the relevant equivalents of the international rope grades in psi.

Rope Grade		outer wires	inner wires
US-name	international equivalent	psi	psi
IRON	–	100 000 – 130 000	170 000 minimum
Traction Steel (TS)	1180/1770	170 000 – 215 000	256 500 minimum
–	1370/1770	198 500 – 278 000	256 500 minimum
–	1570	227 500 minimum	227 500 minimum
Extra high strength Traction Steel (EHS)	1570/1770 or 1770	245 000 – 285 000	256 500 minimum
–	1770	256 500 minimum	256 500 minimum
–	1960	284 000 minimum	284 000 minimum

Explanation for example 700/1180 means:
Outer wires of rope: nominal wire tensile strength grade 700 N/mm²
Inner wires of rope: 1180 N/mm²
and for example 1770 means: all wires in the rope are of the nominal wire tensile strength grade 1770 N/mm²

Rope Replacement Criteria

General
On any type of elevator, the suspension, compensation and governor ropes shall be replaced when their actual diameter is reduced below 94% of the nominal diameter.

Traction Drive Machines with steel or cast iron drive sheaves
Suspension and compensating ropes on traction elevators should be replaced:

a) if the broken wires are equally distributed among the strands, when the number of broken wires per rope lay in the worst section of rope, exceeds the values shown in column **A** of the table, or
b) if the distribution of wires is unequal, and broken wires predominate in one or two strands, when the number of broken wires per rope lay in the worst section of rope exceeds the values shown in column **B** of the table, or
c) if four or five wires, side by side, are broken across the crown of any strand, when the number of broken wires per rope lay in the worst section of rope exceeds the values shown in column **C** of the table, or
d) if an unfavorable condition, such as fretting, corrosion (red dust or rouge), excessive wear of individual wires in the strands, unequal tension, poor sheaves grooves, etc. exist, the criteria for broken wires shall be the values indicated in column **C** of the table, or
e) if there is more than one valley break per rope lay.

This is meant for real valley breaks, not for such valley breaks, which are only consequences of preceeding crownbreaks.

Winding Drum Machines
Ropes should be replaced on winding drum machines:

a) if the broken wires are equally distributed among the strands, when the number of broken wires per rope lay in the worst section of rope exceeds 12 to 18 or,
b) if the broken wires predominate in one or two strands, when the number of broken wires per rope lay in the worst section of rope exceeds 6 to 12,
c) if there is more than one valley break per rope lay.

Number of broken wires

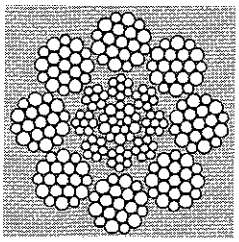
Types of Wire Rope	A*	B*	C*
6 x 19 class	24–30	8–12	12–20
8 x 19 class	32–40	10–16	16–24
DRAKO 250 T / H DRAKO 300 T / TX DRAKO 310 T	32–40	10–16	16–24

6 x 19 class has 6 strands with 16–26 wires per strand.
8 x 19 class has 8 strands with 16–26 wires per strand.
DRAKO 250 T etc. are special Rope Types of DRAKO, see tables.
They have 8 to 10 strands with 19 to 26 wires per strand.
* The upper limits may be used when inspections are made monthly by a competent person.

In any case the national safety requirements in the relevant codes have to be observed.
The above information are not at all absolute criteria for in time rope discard. All signs of rope and sheave deterioration and changes in the condition of the ropes have to be taken into account. Only the experience of a competent person can evaluate the degree of deterioration of the ropes to give a statement about rope replacement.

DRAKO 250 T 8-strand steel core rope for traction drive elevators

Characteristics:	preformed, prestretched (medium), bright, right hand, regular lay
Rope grade:	Extra high strength traction steel (EHS)
Rope diameter tolerance:	unloaded: max. + 3 %, min. + 0 %. Loaded with 10 % F_{min}: max. + 2 %, min. – 1 %

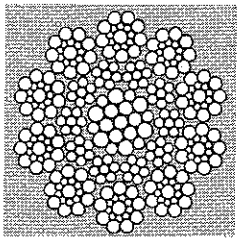
Rope Construction DRAKO 250 T	Nom. Rope diameter		Minimum breaking force F_{min} EHS		Nominal length mass approx.		Metallic area approx.	
	inch	mm	tons	kN	lb./ft.	kg/100 m	sqi	mm²
8 x 19 Warrington – IWRC 	5/16[1]	8	4,87	43,3	0,182	27,1	0,049	31,6
	3/8	9,5	6,87	61,1	0,257	38,2	0,069	44,5
	–	10*	7,61	67,7	0,285	42,3	0,076	49,4
	7/16	11*	9,21	81,9	0,345	51,2	0,093	59,7
	1/2	12,7	12,3	109	0,459	68,3	0,123	79,6
	–	13*	12,9	114	0,481	71,5	0,129	83,4
	5/8	16*	19,5	173	0,729	108	0,196	126
	3/4	19*	27,5	244	1,03	153	0,276	178

* Preferred diameters according to momentarily ISO/DIS 4344

[1]) 5/16" is not for hoist rope application acc. to ASME A17.1

DRAKO 310 T 10-strand fullsteel rope for elevators

Characteristics:	preformed, prestretched (medium), bright, right hand, regular lay
Rope grades available:	1570
Rope diameter tolerance:	unloaded: max. + 2 %, min. 0 %. Loaded with 10 % F_{min}: max. + 1 %, min. – 1 %

Rope Construction DRAKO 310 T	Nom. Rope diameter		Minimum breaking force F_{min} 1570		Nominal length mass approx.		Metallic area approx.	
	inch	mm	tons	kN	lb./ft.	kg/100 m	sqi	mm²
10 x 19 Seale – PWRC 	–	10*	8,54	75,9	0,296	43,9	0,080	51,4
	1/2	12,7	13,8	122	0,477	70,9	0,128	82,8
	–	13*	14,4	128	0,500	74,2	0,135	86,8
	5/8	16*	21,9	194	0,757	112	0,204	131
	3/4	19*	30,8	274	1,07	159	0,287	185

* Preferred diameters according to momentarily ISO/DIS 4344 1 ton = 2000 lbs = 1 short ton

To make correct rope installation easier, especially for highrise elevators, DRAKO 310 T ropes are produced with a blue line along the rope. If the ropes have opened up during installation the blue line helps to correct this.

PFEIFER DRAKO

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08/03 Printed in Germany

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Management Service

CERTIFICATE

The Certification Body
of TÜV SÜD Management Service GmbH
certifies that

PFEIFER DRAKO

Pfeifer Drako Drahtseilwerk GmbH & Co. KG
Rheinstraße 19-23
D-45478 Mülheim a. d. Ruhr

has established and applies
a Quality Management System for

Development, Manufacture and Distribution of
ROPES AND ROPE ACCESSORIES

An audit was performed, Report No. **70016618**
Proof has been furnished that the requirements
according to

ISO 9001: 2000

are fulfilled. The certificate is valid in conjunction
with the main-certificate until **2010-09-20**
Certificate Registration No. **12 100 6068/01 TMS**

Munich, 2007-10-10

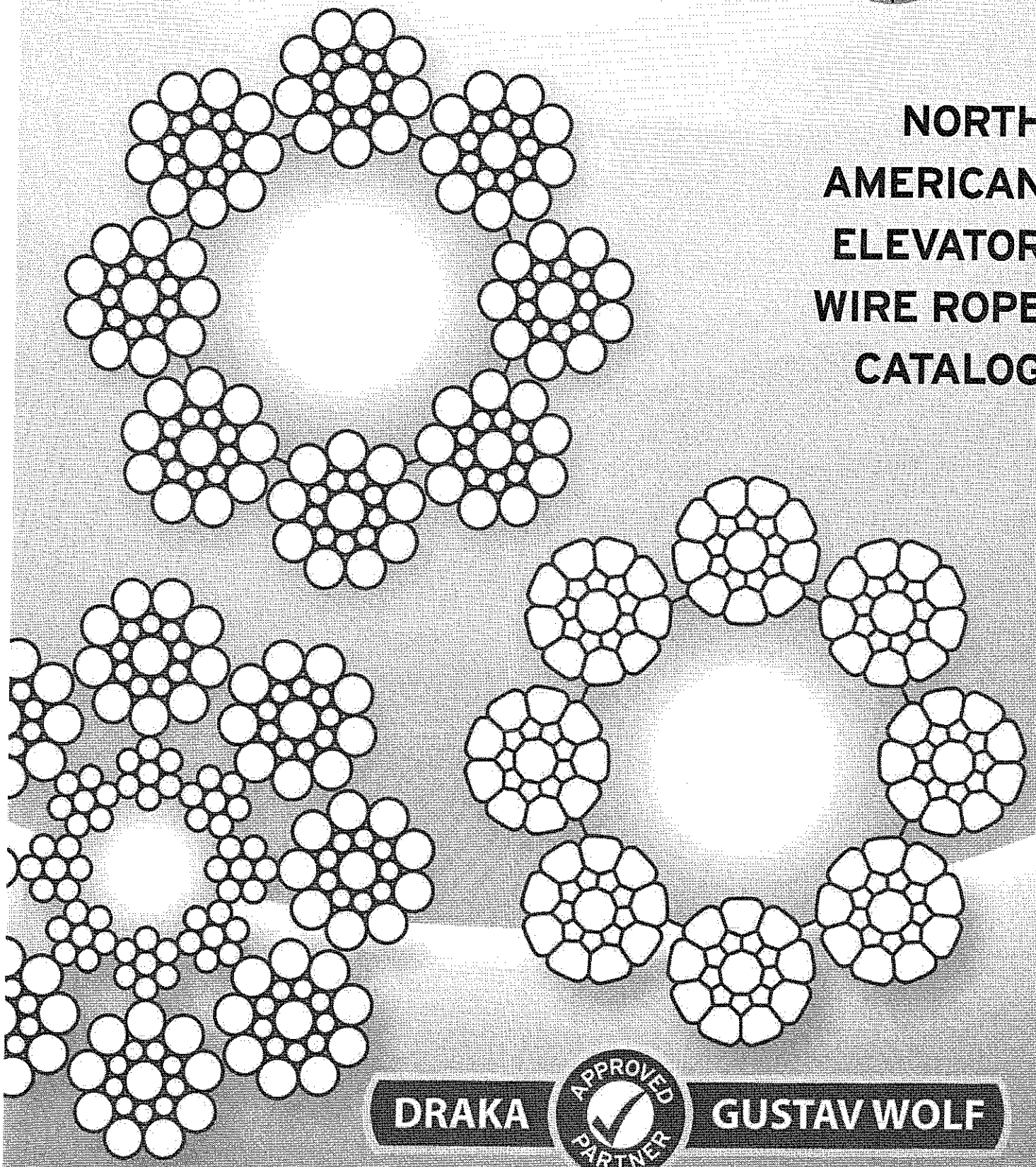
QMS-TGA-ZM-07-92

TÜV SÜD Management Service GmbH • Zertifizierstelle • Ridlerstraße 65 • 80339 München • Germany

MS01/10.05

GUSTAV WOLF

Steel Wire & Steel Wire Ropes



NORTH AMERICAN ELEVATOR WIRE ROPE CATALOG

DRAKA APPROVED PARTNER GUSTAV WOLF

Wire Rope by Gustav Wolf

General information

Since 1887, Gustav Wolf has been a well-known name in wire ropes. All Gustav Wolf elevator wire ropes are designed and manufactured by Gustav Wolf to meet the requirements of the elevator industry worldwide. Gustav Wolf offers a full line of elevator wire ropes, including:

"Low-stretch" fiber core wire rope in Iron, Traction and Extra High Strength Traction grades that provide the benefits of pre-stretching without paying the premium price.

PAWO F3 steel reinforced core wire rope for high-rise/high-speed elevators to reduce or eliminate the labor cost of repeated rope shortenings. It can be used wherever EHST grade is specified.

CompactTrac™ compacted-strand fiber core wire rope for use with reverse bends and basement machines to extend rope life.

Ordering hoist ropes

The information needed to order wire rope is the number (quantity), length and diameter of the ropes; their stranding, construction and lay; their grade or tensile strength; and their breaking load. While this information may be provided on the wire rope tag, it should be noted that the tag information may not always be accurate. For instance, it is not uncommon to find that the wrong tag has been applied. Use the following procedure for ordering hoist ropes for a traction elevator:

1) **Count the number of ropes on the elevator.**
2) **Determine the length of each rope.** The length can often be found on the installation layout.
3) **Measure the diameter of the ropes.** If you don't have a measuring tool, the crosshead data plate on top of the car should show the diameter or the diameter may be stamped on the existing shackles.
4) **Determine the stranding and construction of the rope.** Stranding is the number of strands per rope and the number of wires per strand (ex. an 8-stranded rope with 19 wires per strand has 8 x 19 stranding). Determine whether the rope has 6 or 8 strands by looking at the shackles where the stranding is more easily seen. The rope construction (Seale, Warrington, Filler Wire, etc.) can be found by matching up the rope cross-section with the cross-section shown on the following pages.

   A 6-strand hoist rope is usually 6 x 25 Filler Wire construction with Right Regular lay.

   If there is not a crosshead data plate and the building is over 50 years old, the ropes used are usually 6 x 25 Filler Wire with Right Regular lay.

   An 8-strand hoist rope is usually 8 x 19 Seale. Lay can vary (see Step 5 below).
5) **Determine the lay of the rope.** Compare a Right Regular lay rope to a Right Lang lay rope:

   Right Regular **Right Lang**

   Note that the orientation of the individual wires is parallel to the centerline in a Right Regular lay rope. Right Regular lay is assumed if the lay is not indicated on your order.
6) **Determine the grade or tensile strength of the rope.** Grades are Iron, Traction or Extra High Strength Traction. Iron rope is normally used for governor and compensation ropes. Traction rope can be used for hoist, governor and compensation applications. Extra High Strength Traction rope is needed for high-rise/high-speed hoisting conditions. Grade is sometimes expressed as tensile strength in Newtons/square millimeters (N/mm^2) or pounds/square inch (psi).
7) **Determine the breaking load,** which is indicated on the crosshead data plate. For example, if a breaking load of 14,500 lbs. is indicated for 1/2" diameter 8 x 19 ropes, refer to the information in this catalog or call your Gustav Wolf representative for the correct grade (in this case, traction grade).

Other factors:

Core: Vegetable fiber is the most common core used in elevator ropes in North America. However, in some high-rise/high-speed and certain hydraulic applications, the use of steel reinforced or full steel core (IWRC) ropes is becoming more common. Contact your Gustav Wolf representative for more information.

Preforming: Preformed rope is the industry standard and provides longer operational life while being easier to handle. All the ropes in this catalog are preformed

Coating: Bright (uncoated) is the industry standard and comes without any coating on the rope other than lubrication. For protection from weather and corrosion (ex. exterior or mine elevators), the use of a galvanized coating is often recommended. Gustav Wolf 1/2" and 5/8" 8 x 19 Seale galvanized hoist ropes are in stock for immediate delivery.

Ordering governor and/or compensation ropes

The ordering procedure is similar to hoist ropes but you may have to rely on the rope tag to a greater degree because there is no crosshead data plate for governor or compensation ropes. However:

1) Measure the diameter of the ropes with a caliper, micrometer or Go/No Go gauge.
2) Go to the shackles and confirm the stranding (6 or 8) of the ropes. Almost all compensation and governor ropes have 8 strands (refer to the rope cross sections shown on the following pages).

   Look at the rope tag to determine breaking strength and then refer to the information in this catalog or call your Gustav Wolf representative for the correct grade (Iron or Traction).
3) Consider the rope grade or tensile strength. Governor and compensation ropes are either Iron or Traction - never Extra High Strength Traction.
4) The lay of governor and compensation ropes is almost always Right Regular and never Right Lang. If your tag shows Lang lay, take extra care to visually confirm it using Step 5 in the Hoist Ropes section above.

Other factors:

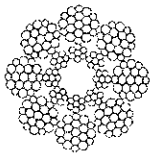
Preformed rope is always preferred for its longer life and ease of installation. Replace all governor and compensation ropes with preformed ropes.

Wire Rope

Metric diameters to meet ISO 4344 and EN 12385

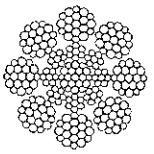
Metric hoist PAWO F7 - 8 x 19 Warrington with steel reinforced core

Part Number	Application	Diameter mm	Tensile Strength N/mm²	Right Lay	Breaking Load lbs • N	Net Weight lbs/ft • kg/m
80-056	Hoist	8.0	1570	Regular	8700 • 38700	0.17 • 0.26
80-027	Hoist	9.0	1570	Regular	11100 • 49300	0.22 • 0.33
80-029	Hoist	10.0	1570	Regular	13600 • 60400	0.27 • 0.40
80-030	Hoist	11.0	1570	Regular	16400 • 73100	0.33 • 0.49
80-031	Hoist	12.0	1570	Regular	19400 • 86400	0.39 • 0.58
80-033	Hoist	13.0	1570	Regular	22500 • 100000	0.45 • 0.67
80-034	Hoist	14.0	1570	Regular	26600 • 118500	0.53 • 0.79
80-036	Hoist	16.0	1570	Regular	34400 • 152800	0.68 • 1.02
80-004	Hoist	18.0	1570	Regular	43100 • 191600	0.86 • 1.28
80-059	Hoist	19.0	1570	Regular	48200 • 214800	0.96 • 1.43



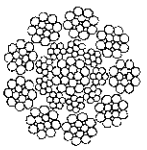
Metric hoist PAWO F7S - 8 x 19 Warrington with Independent Wire Rope Core

Part Number	Application	Diameter mm	Tensile Strength N/mm²	Right Lay	Breaking Load lbs • N	Net Weight lbs/ft • kg/m
80-056SC	Hoist	8.0	1570	Regular	9000 • 39900	0.19 • 0.28
80-027SC	Hoist	9.0	1570	Regular	11400 • 50700	0.24 • 0.36
80-029SC	Hoist	10.0	1570	Regular	14000 • 62300	0.29 • 0.44
80-030SC	Hoist	11.0	1570	Regular	16900 • 75300	0.36 • 0.53
80-031SC	Hoist	12.0	1570	Regular	20100 • 89600	0.42 • 0.63
80-033SC	Hoist	13.0	1570	Regular	23300 • 103700	0.49 • 0.73
80-034SC	Hoist	14.0	1570	Regular	27500 • 122100	0.58 • 0.86
80-036SC	Hoist	16.0	1570	Regular	35400 • 157600	0.74 • 1.11
80-004SC	Hoist	18.0	1570	Regular	44500 • 197900	0.93 • 1.39
80-059SC	Hoist	19.0	1570	Regular	49900 • 221900	1.05 • 1.56



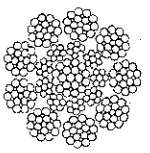
Metric hoist PAWO F10 - 9 x 17 Filler Wire with Independent Wire Rope Core

Part Number	Application	Diameter mm	Tensile Strength N/mm²	Right Lay	Breaking Load lbs • N	Net Weight lbs/ft • kg/m
80-102	Hoist	8.0	1570	Regular	8900 • 39600	0.19 • 0.28
80-103	Hoist	9.0	1570	Regular	11300 • 50400	0.23 • 0.35
80-105	Hoist	10.0	1570	Regular	13800 • 61600	0.29 • 0.43
80-106	Hoist	11.0	1570	Regular	16700 • 74200	0.35 • 0.52
80-107	Hoist	12.0	1570	Regular	20100 • 89200	0.42 • 0.63



Metric hoist PAWO F10 - 9 x 21 Filler Wire with Independent Wire Rope Core

Part Number	Application	Diameter mm	Tensile Strength N/mm²	Right Lay	Breaking Load lbs • N	Net Weight lbs/ft • kg/m
80-109	Hoist	13.0	1570	Regular	23700 • 105600	0.50 • 0.75
80-110	Hoist	14.0	1570	Regular	27600 • 122700	0.59 • 0.88
80-113	Hoist	16.0	1570	Regular	36200 • 161000	0.76 • 1.14
80-116	Hoist	18.0	1570	Regular	45400 • 202000	0.96 • 1.44
80-117	Hoist	19.0	1570	Regular	50500 • 224700	1.08 • 1.61



All listed Gustav Wolf wire rope is **preformed, right lay** with a **bright** (uncoated) finish.

All popular items are in stock for immediate delivery.

Less popular items and other diameters, strandings, constructions, grades, coatings, etc. are available by special order.

North American distribution locations and ordering information

United States

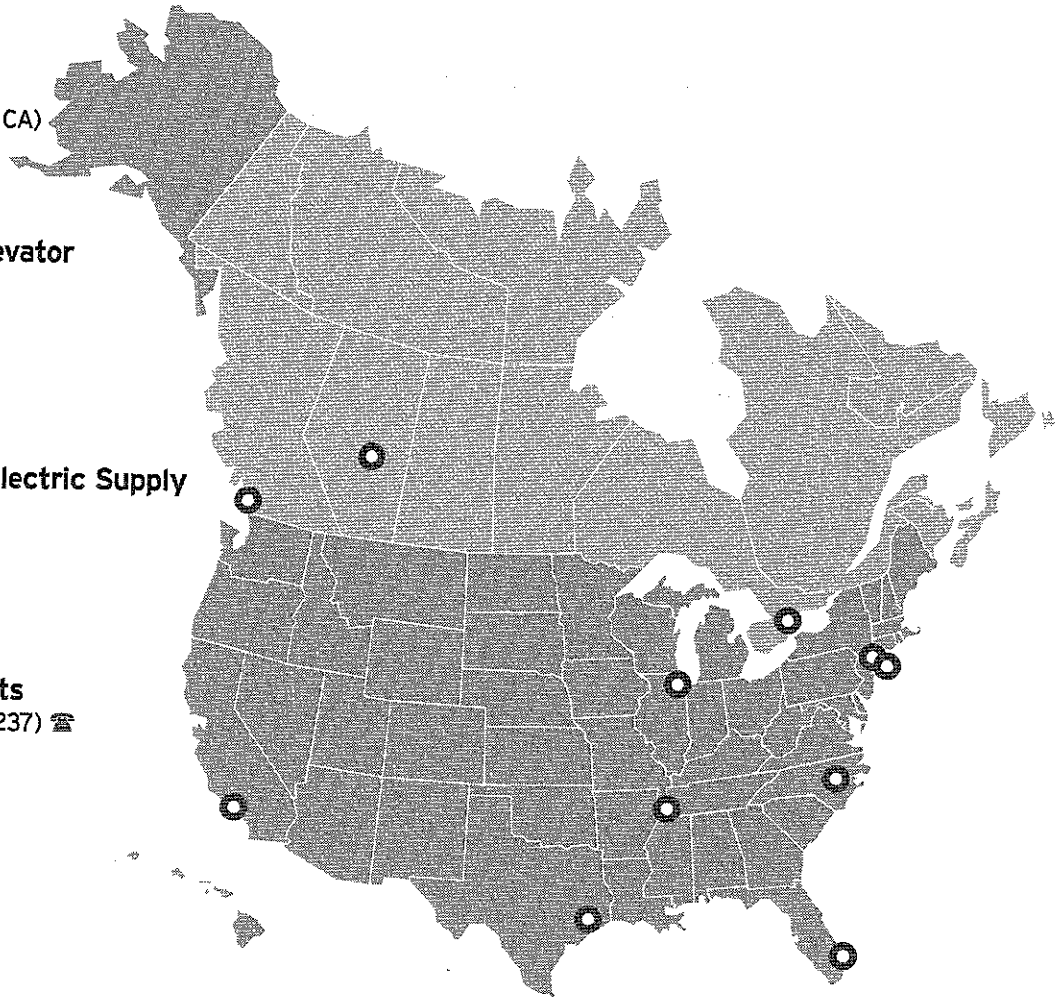
Draka Elevator Products
877-DRAKA-EP (877-372-5237) ☎
252-972-6001 🖷
- Brooklyn, NY
- Chicago (Wood Dale, IL)
- Houston, TX
- Los Angeles (Commerce, CA)
- Memphis (Walnut, MS)
- Rocky Mount, NC

Benfield Electric & Elevator Supply Corp.
718-706-8600 ☎
718-706-8665 🖷
- Bronx, NY

S.E.E.S., Inc./ Southern Elevator & Electric Supply
800-526-0026 ☎
954-917-7337 🖷
- Pompano Beach, FL

Canada

Draka Elevator Products
877-DRAKA-EP (877-372-5237) ☎
252-972-6001 🖷
- Edmonton, AB
- Toronto (Brantford, ON)
- Vancouver, BC



North American technical support

Gustav Wolf
Richard L. Lindemeyer
General Manager - North America
919-878-5605 ☎ 🖷
richard.lindemeyer@gustav-wolf.com
www.gustav-wolf.de

GUSTAV WOLF

Steel Wire and Steel Wire Ropes

CERTIFICATE

Management system as per
DIN EN ISO 9001 : 2000

In accordance with TÜV CERT procedures, it is hereby certified that

GUSTAV WOLF
Seil- und Drahtwerke GmbH & Co. KG
Sundernstr. 40
33332 Gütersloh
Germany

applies a management system in line with the above standard for the following scope

Design, Manufacturing, and Assembling of Steelwire and Steelwire Ropes in Gütersloh, Nebra and Herzebrock-Clarholz.

Certificate Registration No. 08 100 949112
Audit Report No. 3501 1596

Valid until 2010-01.31
Initial certification 1994

TÜV CERT Certification Body
at TÜV NORD CERT GmbH

Essen, 2007-02-22

This certification was conducted in accordance with the TÜV CERT auditing and certification procedures and is subject to regular surveillance audits.

TÜV NORD CERT GmbH Langemarckstrasse 20 45141 Essen www.tuev-nord-cert.com

TGA-ZM-30-96-00

ThyssenKrupp Elevator
Americas Business Unit

Product Engineering

ThyssenKrupp

Memo

From: Jerry Kennedy – Product Engineering
Date: Feb 2, 2007
Re: Plastic Sheaves – ISIS Elevators

A new non- metallic sheave material appeared on the European and Asian market and has been used successfully since 1970. This material is a thermoplastic cast polyamide – 6 "Optamid". It has a specific weight that is 1/7 of steel and a high module of elasticity with excellent wear resistance. It can be cast in molds and machined with low tolerances. Several other advantages are:

1. Noise Reduction
2. Reduction in vibration
3. Resistance to rope lubricants
4. Increased rope life

The following charts show some of the characteristics of these sheaves that allow it to be an excellent alternative to steel for elevator use.

ThyssenKrupp Elevator
Manufacturing
134 Tennessee Street, PO Box 370
Middleton, TN 38052
Telephone: 731-376-8444
Fax: 731-376-3127
E-mail:
jerry.kennedy@thyssenkrupp.com
Internet:
www.thyssenkruppelevator.com

Plastic pulleys for elevators

NOTE:
Page excerpts taken from this presentation for brevity where page numbers reflect. The presentation material is available on request in it's entire form.

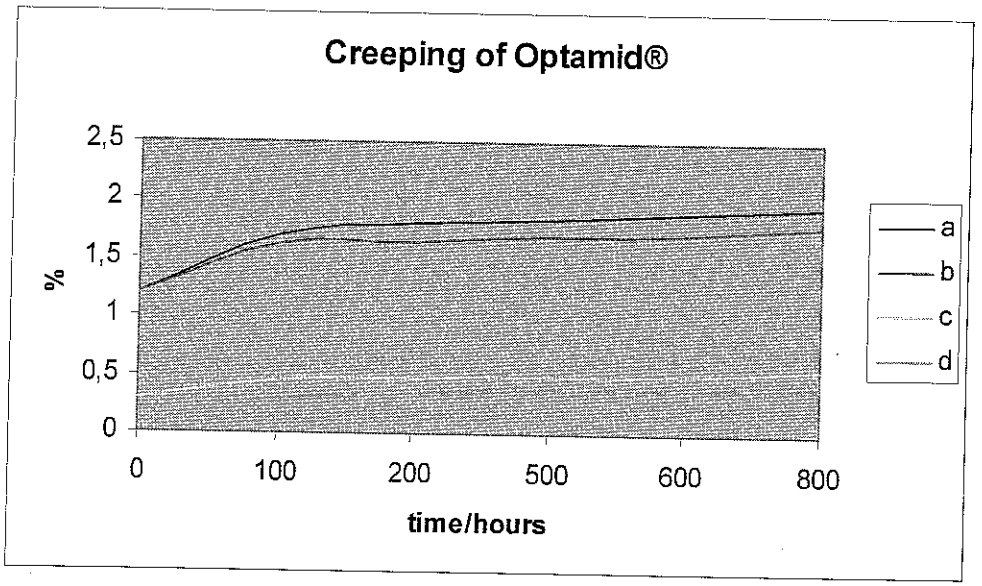
SCHWARTZ
TECHNICAL PLASTICS

Optamid® : Material properties

Property	UNITS	Test Methods	
Specific Gravity	-	ASTM D792	1.15-1.17
Tensile Strength	psi	ASTM D638	10,000-13,000
Tensile Elongation	%	ASTM D638	20-55
Tensile Modulus	psi	ASTM D638	400,000-550,000
Compressive Strength (q 10% offset	psi	ASTM D695	13,500-16,000
Compressive Modulus	psi	ASTM D695	325,000-400,000
Flexural Strength	psi	ASTM D790	15,500-17,500
Flexural Modulus	psi	ASTM D790	420,000-500,000
Shear strength	psi	ASTM D732	10,000-11,000
Notched Izod Impact	ft.lbs/in.	ASTM D256	0.7-0.9
Hardness, Shore D	D	ASTM D2240	78-83
Hardness, Rockwell	R	ASTM D785	115-125
Deformation under load	%	ASTM D621	0.5-1.5
Continuos Service Temp.	deg F	-	230
Intermittent Service Temp.	deg.F	-	330

Optamid® : Creeping properties

Optamid® offers a good creeping resistance under dynamical and static circumstances.



a: pressure load 1800 psi (12.7 N/mm2)

b: tensile load 1800 psi

c: pressure load: 500 psi (3.52 N/mm2)

d: tensile load 500 psi

SCHWARTZ TECHNICAL PLASTICS

Optamid® pulleys: Maximum permitted cable pull

Loads on the pulleys are limited by:

1. the wear on the goove
2. the premitted surface pressure in the bore

Depending on rope geometry and diameter,the following maximum values are achieved:

Permitted cable pull per cable (lbs)

Cable dia		Pulley diameter						
		320	360	400	450	500	520	mm
mm	inch	12.598	14.173	15.748	17.717	19.685	20.472	inch
8	0,315	4409	4850	5512	6173	6835	7055	
9	0.354	-	5291	5953	6614	7496	7716	
10	0.394	-	-	6614	7275	8158	8599	
11	0.433	-	-	-	8157	9260	9480	
12	0.472	-	-	-	-	9921	10,362	
13	0.512	-	-	-	-	-	11,024	

SCHWARTZ TECHNICAL PLASTICS

Optamid® pulleys: Permitted axle loads

Depending on the geometry of the deep groove ball bearings (disregarding their load bearing activity) or, in the case of friction bearings, of the axle diameter and hub width, the following sizes apply:

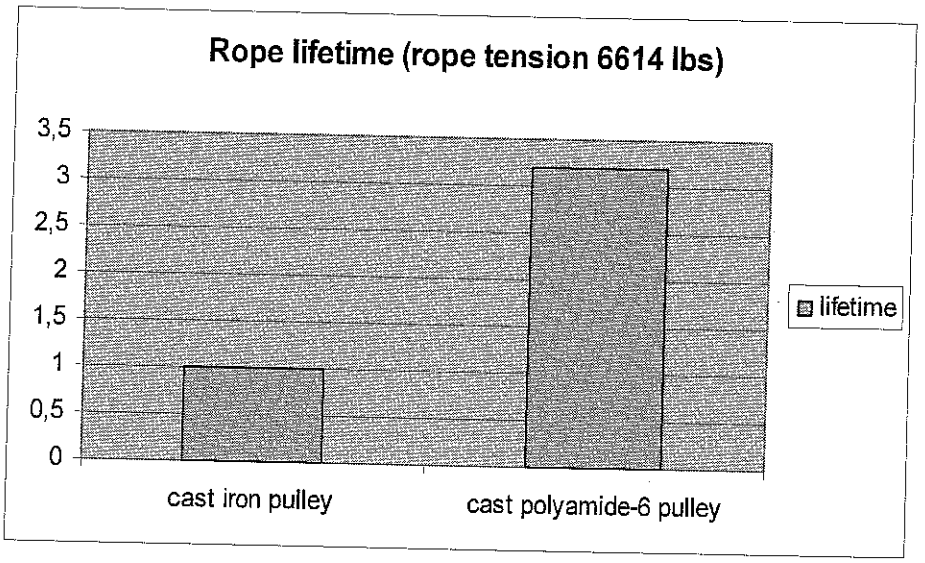
		Axle diameter			
		50 1.969	55 2.165	60 2.362	mm inch
use of deep grove ball bearings	Bearing				
	Series 60 DIN 625	11,464 lbs	13,890 lbs	14,551 lbs	
	Series 62 DIN 625	15,874 lbs	17,638 lbs	20,504 lbs	
use of gunmetal bushes (RG7)	Nominal pulley dia (mm/inch)				
	320/12.6	13,450 lbs	14,772 lbs	-	
	360-520/14.2-20.5	19,407 lbs	21,392 lbs	23,377 lbs	

SCHWARTZ TECHNICAL PLASTICS

Optamid® pulleys: Rope lifetime

By using Optamid® pulleys the lifetime of the rope increases.

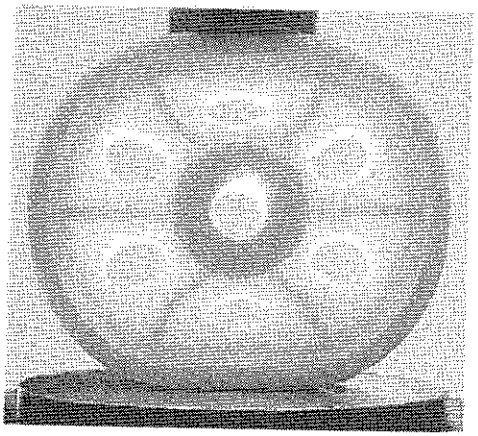
The following chart is showing the increase of the lifetime of ropes in use with cast polyamide-6 pulleys.



SCHWARTZ TECHNICAL PLASTICS

Optamid® pulleys: Material safety

Optamid® pulleys are used in the direct conveyance of persons, therefore safety first is the rule that applies throughout. The material was monitored by institutes and the German Engineering Control Association (TÜV) and meets today´s technical requirements.
It is fully approved by the TÜV!



Optamid® pulleys:Material safety

The classification for Optamid® according to UL 94 (United Laboratories) is V-2.

V-2 means the material is self extinguishing, burning drops are excepted.

The material is hardly inflammable.

Test procedure:

Fire testing of plates

Prüfung von Platten

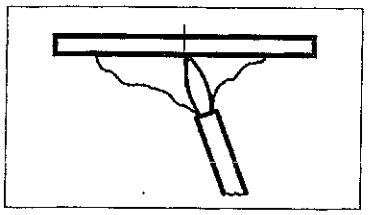


Bild 3: Brennbarkeit fester Proben nach UL 94-5VB

Fire testing of sticks

Prüfung von Stäben

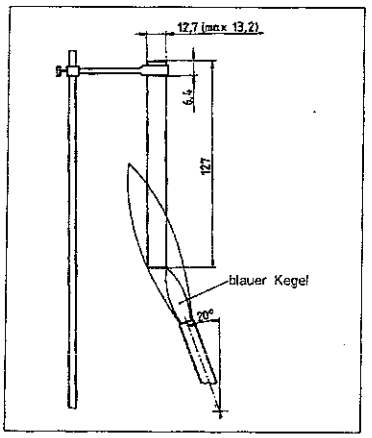


Bild 2: Brennbarkeit fester Proben nach UL 94-5VA

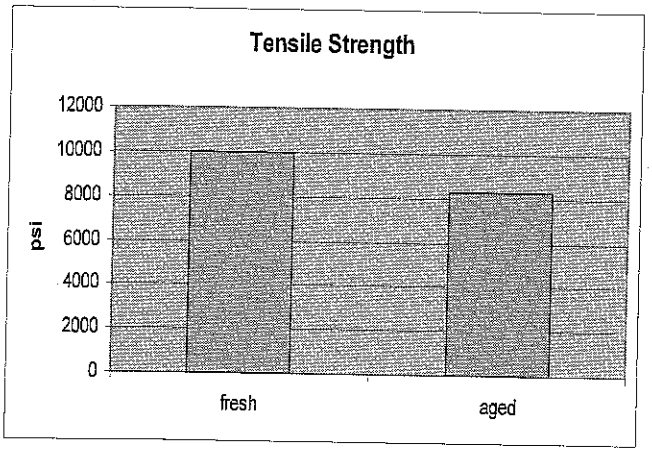
SCHWARTZ TECHNICAL PLASTICS

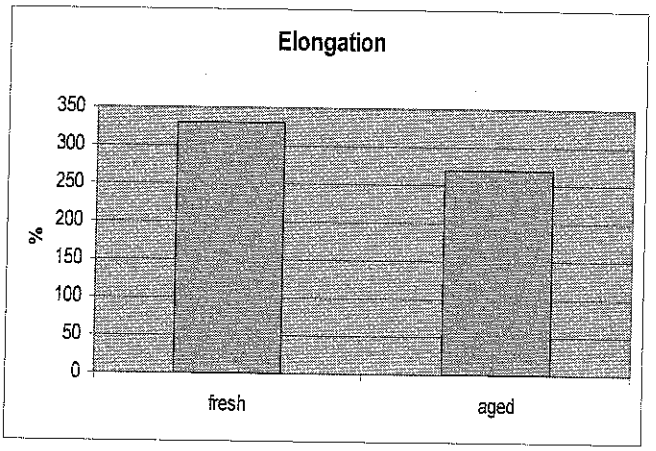
Optamid® pulleys:Ageing

Optamid® is a non- or slow ageing material.

Under UV radiation the outer surface becomes dirty looking but the technical performances are not influenced.

All technical characteristics stay in the level the material was provided





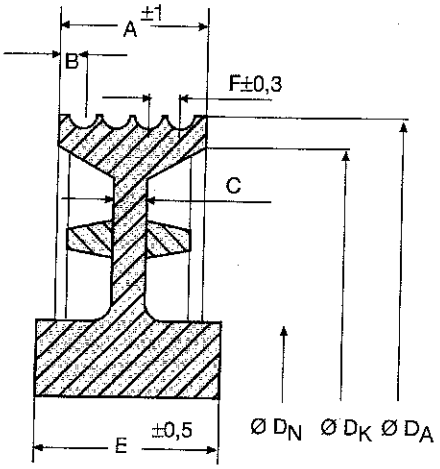
Material aged 8 days at 280°F

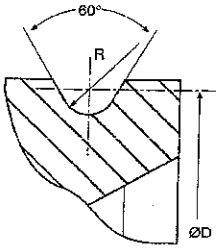
Table of contents

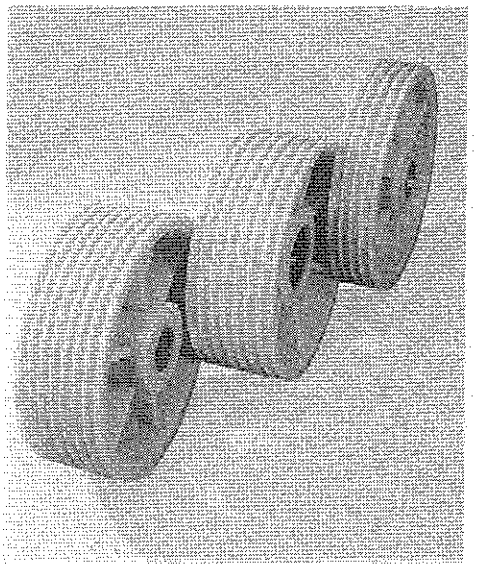
SCHWARTZ TECHNICAL PLASTICS

Optamid® pulleys: Design

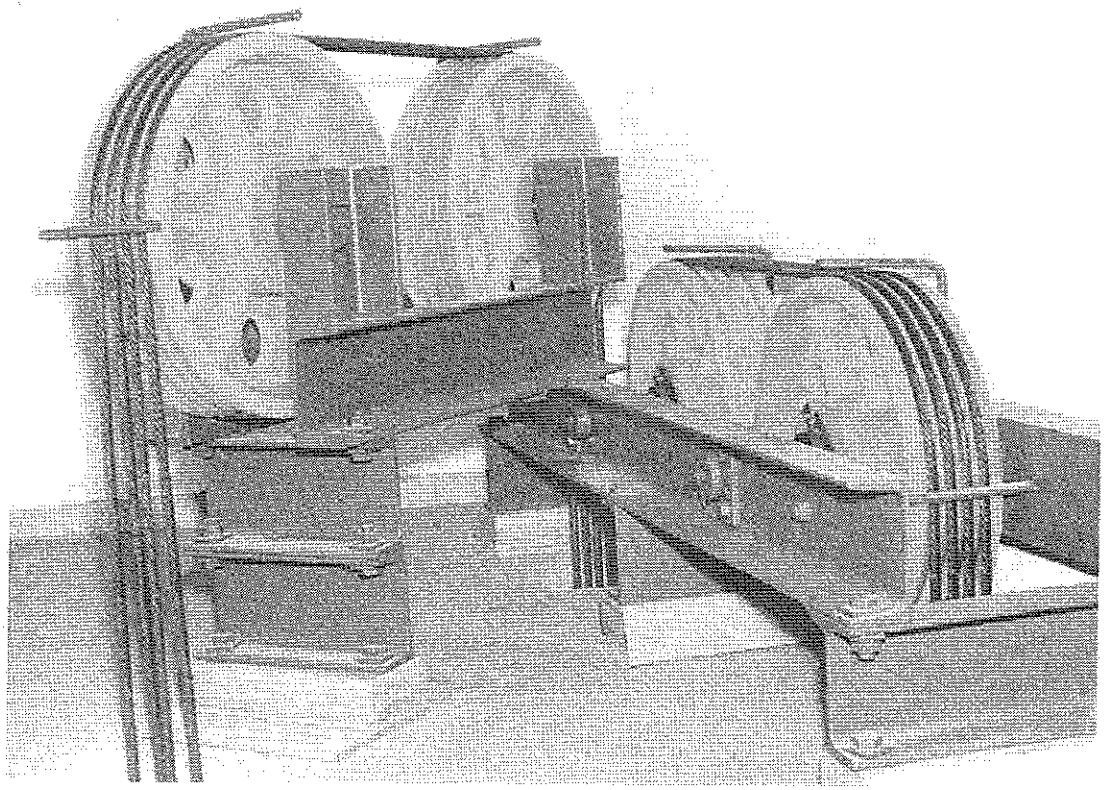
The design of the pulleys is similar to the cast iron steel pulleys. All dimensions can be machined to the technical requirements. Multiple grooves are no problem:



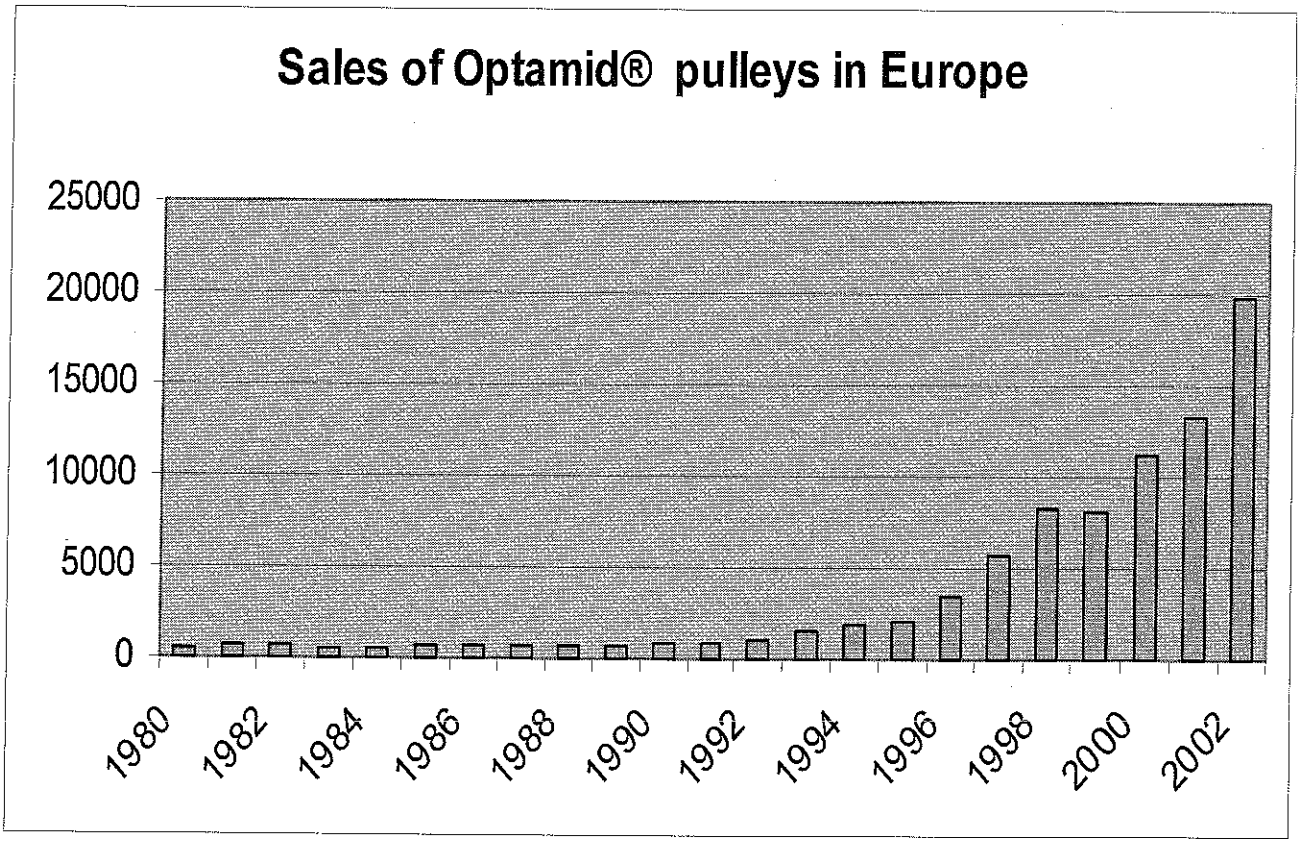




Optamid® pulleys: Existing application



Optamid® pulleys:Sales developement



ThyssenKrupp

FEA of A Compounding/Deflector Sheave synergy L Systems

By: Dr. Chu-Ho Lu

Research and Development
ThyssenKrupp Elevator

February 29, 2008

I. Background

Figure 1 shows the plastic sheave designed for the deflector in the synergy L systems that provide service up to a 5000 lb car. The sheave is 12.6 inches (320 mm) in diameter and has seven grooves that fit to ∅0.315 inches (8 mm) wire ropes. The purpose of this study is to investigate whether the sheave has sufficient strength in normal elevator operation.

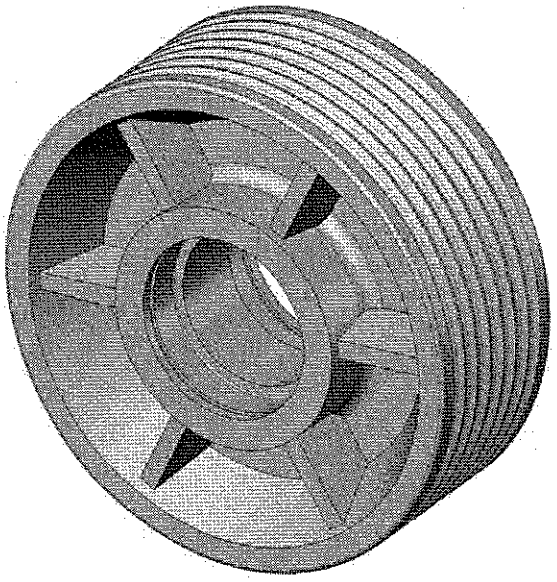


Figure 1: A Plastic Sheave

The deflector sheave is made of thermoplastic synthetic materials manufactured by Schwartz Technical Plastics and is designated as Cast Polyamide-6. It offers a low specific weight (approx. 1/7 of steel), a high modulus of elasticity and an excellent wear resistance. Based on the test method, ASTM D638, the sheave is reported to have the following mechanical properties:

Tensile strength	10,000-13,000 psi
Modulus of elasticity	400,000-550,000 psi
Poisson's ratio (assumed)	0.4
Elongation	20-55%

II. Finite Element Modeling

II.1 Loading and boundary conditions to the sheave

For a 5,000 lb car with a 2:1 roping and 4,400 lb empty car weight, the rope tension on the fully loaded car would be 4,700 lbs. Figure 2a depicts the loaded compounding sheave with a wrap angle of 180^0, while Figure 2b shows the deflector sheave with a wrap angle of 90^0.

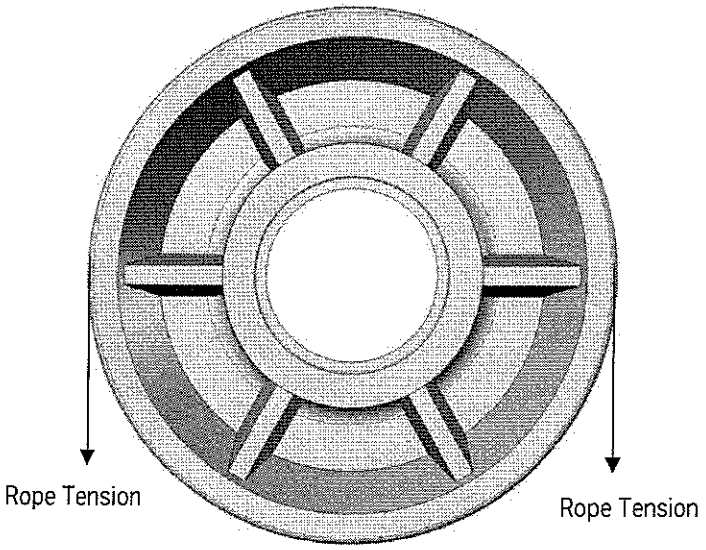


Figure 2a: A Compounding Sheave with 180^0 Wrap Angle

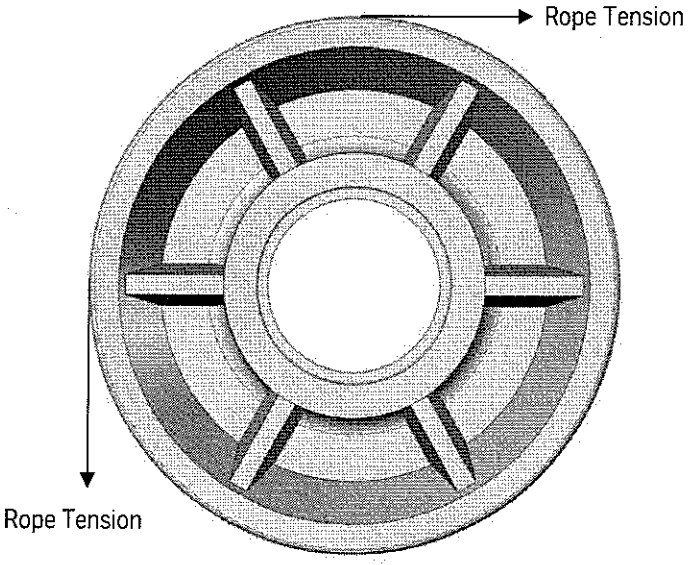


Figure 2b: A Deflector Sheave with 90^0 Wrap Angle

Figures 3a and 3b show the finite element models of the sheaves. Each sheave is supported by bearings and the associated shaft, hence the inside surfaces of the sheave are constrained for the radial displacements.

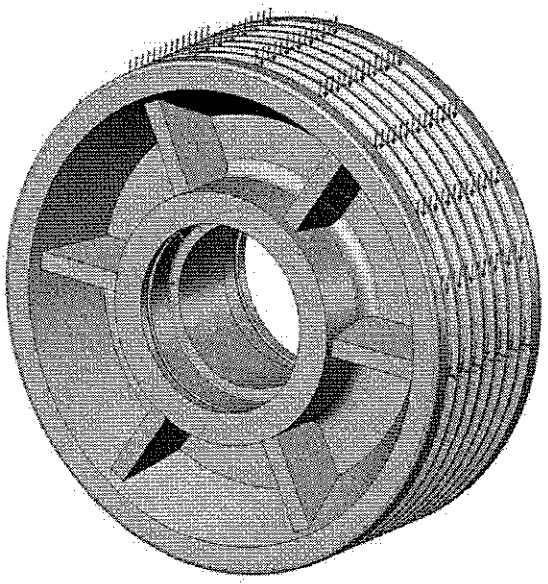


Figure 3a: Loading and Constraints to the Compounding Sheave (180^0 wrap angle)
[Loads (red arrows), Constraints (green arrows)]

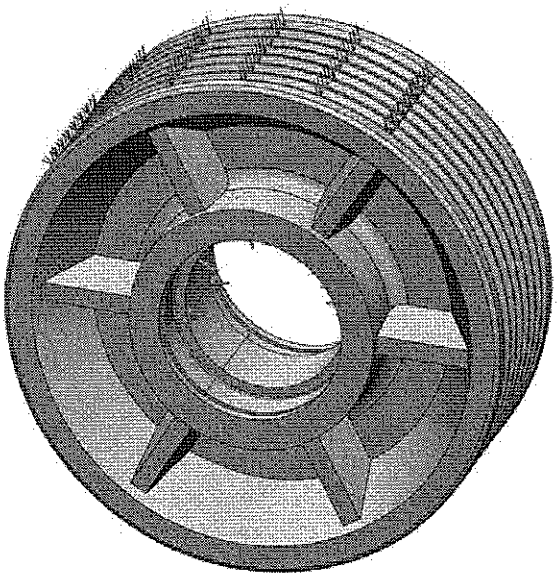


Figure 3b: Loading and Constraints to the Deflector Sheave (90^0 wrap angle)
[Loads (red arrows), Constraints (green arrows)]

Due to the tension in each rope, non-uniform pressures are developed on the grooves of the sheave. The relationship between the round-groove pressures and the rope tensions are known as,

$$p = \frac{8T\cos\phi}{Dd(\delta + \sin\delta)}$$

where D is the pitch diameter of the sheave, d is the nominal rope diameter, T is the rope tension, and δ is the contact angle in radians. For ϕ = 0, i.e., cosϕ = 1, the pressure attains the maximum value so that it occurs at the bottom of the groove.

For a fully loaded car with a 2:1 roping, D = 12.6 inches, d = 0.315 inches, δ = $2\pi/3$, T = 671 lbs, and the maximum groove pressure would be 457 psi.

II.2 FEA mesh of the sheave

The sheave is meshed with 10-node tetrahedron elements. The mesh of the FEA model (Figure 4) contains 64,173 elements and 40,233 nodes.

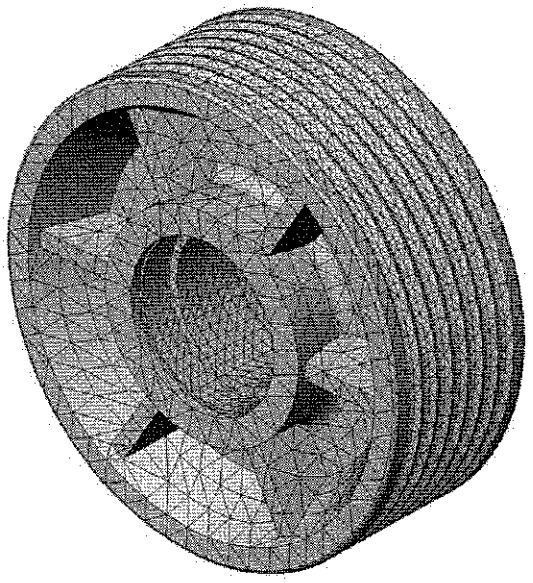


Figure 4: The Finite Element Mesh of the Sheave

II.3 FEA results and Conclusions

The material properties of the sheave, as given in Section I, show that the elongation is more than 20%. The sheave should be considered as a ductile material and would follow the maximum Von Mises stress failure criteria. Figures 5 and 6 depict the von Mises stress distribution for the sheaves. The maximum stresses appear to be 984.8 psi for the sheave with 180^0 wrap angle and 969.9 psi for the one with 90^0, giving the safety factors of 10.15 (i.e., 10,000/984.8) and 10.31, respectively. Those stresses occur in the central groove and around the area between the supporting ribs. The FEA results suggest that, in the current application, the maximum stresses in the sheave is very dependent on the groove pressure (or rope tension), and are insensitive to the change of the sheave's wrap angle. The extreme stress generated in the sheave with 90^0 wrap angle appears to be somewhat lower than that with 180^0 angle.

Cars with other duties are also investigated. The following table summarizes the cars' specifications and the associated safety factors (based on 180^0 wrap angle):

Model No.	Capacity (lbs)	Empty Car (lbs)	Cwt (lbs)	Factor of Safety
2,500 DE	2,500	3,375	4,555	16.24
3,000 DE	3,000	3,450	4,855	14.79
3,500 DE	3,500	3,620	5,250	13.15
4,500 DE 54"	4,500	4,200	6,505	10.97
5,000 DE 54"	5,000	4,400	6,960	10.15

According to Rule 2.24.3 of ASME A17.1-2007, the factor of safety in the design of sheaves should be not less than (a) 8 for metals having an elongation of at least 14%; and (b) 10 for cast iron, or for metals having an elongation of less than 14%. In addition, Rule 2.24.3 (c) of SMTG 101R10 A17.6, Suspension Means Standard, requires that the factor of safety should be not less than 10 for sheaves made of plastic. The current FEA results show that the designed compounding/deflector sheave complies with the requirements of the ASME Safety Code for Elevators and Escalators.

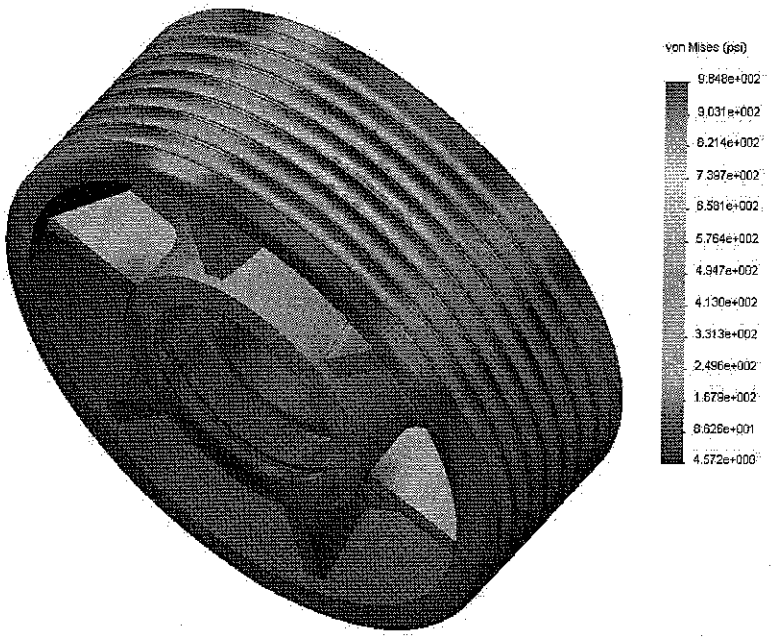


Figure 5: Von Mises Stress Field in the Compounding Sheave (180^0 wrap angle)

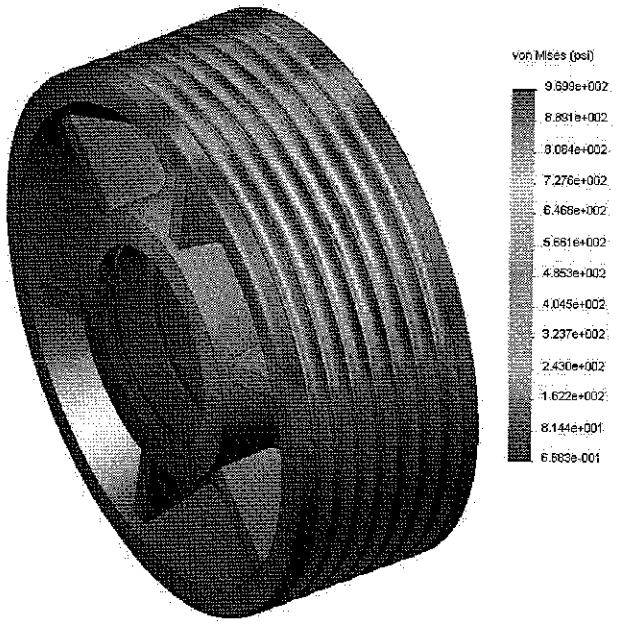


Figure 6: Von Mises Stress Field in the Deflector Sheave (90^0 wrap angle)

DEPARTMENT OF LABOR & ECONOMIC GROWTH

Bureau of Construction Codes
Elevator Safety Division
2501 Woodlake Circle
Okemos, MI 48864
(517) 241-9337

2009

Schedule of Elevator Board Meetings
And Licensing Examinations

BOARD MEETINGS

DATE	LOCATION	TIME	APPLICATION DEADLINE
Friday, January 23, 2009	Okemos, Conf 3	9:30 a.m.	January 2, 2009
Friday, March 27, 2009	Okemos, Conf 3	9:30 a.m.	March 6, 2009
Friday, June 12, 2009	Okemos, Conf 3	9:30 a.m.	May 22, 2009
Friday, August 28, 2009	Okemos, Conf 3	9:30 a.m.	August 7, 2009
Friday, November 6, 2009	Okemos, Conf 3	9:30 a.m.	October 16, 2009

EXAMINATION DATES

CONTRACTOR AND GENERAL COC EXAM	LOCATION	TIME	APPLICATION DEADLINE
Friday, January 23, 2009	Okemos, Conf 2	9:30 a.m.	January 2, 2009
Friday, March 27, 2009	Okemos, Conf 2	9:30 a.m.	March 6, 2009
Friday, June 12, 2009	Okemos, Conf 2	9:30 a.m.	May 22, 2009
Friday, August 28, 2009	Okemos, Conf 2	9:30 a.m.	August 7, 2009
Friday, November 6, 2009	Okemos, Conf 2	9:30 a.m.	October 16, 2009

JOURNEYPERSON EXAM	LOCATION	TIME	APPLICATION DEADLINE
Tuesday, January 13, 2009	Okemos, Conf 3	9:30 a.m.	December 23, 2008
Tuesday, March 10, 2009	Okemos, Conf 3	9:30 a.m.	February 17, 2009
Tuesday, May 12, 2009	Okemos, Conf 3	9:30 a.m.	April 21, 2009
Tuesday, July 7, 2009	Okemos, Conf 3	9:30 a.m.	June 16, 2009
Tuesday, September 8, 2009	Okemos, Conf 3	9:30 a.m.	August 18, 2009
Tuesday, November 24, 2009	Okemos, Conf 3	9:30 a.m.	November 3, 2009

Mailing address: DLEG/BCC/Elevator Safety
PO Box 30255
Lansing MI 48909

The meeting site and parking are accessible. Individuals attending the meeting are requested to refrain from using heavily scented personal care products, in order to enhance accessibility for everyone. People with disabilities requiring additional services (such as materials in alternative format) in order to participate in the meeting should call Laurie Bass at (517) 241-9337 at least 10 work days before the event. DLEG is an equal opportunity employer/program.